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AQUILAE 1918.4

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Reprinted from the Proceedings of the NATIONAL ACADEMY OF SCIENCES,  
Vol. 9, No. 2, pp. 39-40. February, 1923.



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Communicated December 16, 1922

The new star originally designated as Nova Aquilae, No. 3, and according to the new nomenclature<sup>1</sup> called Nova Aquilae 1918.4, was the brightest nova for more than three centuries. It was discovered early in June, 1918, by a hundred or more different observers. Three separate investigations of the star were begun immediately at the Harvard Observatory.

Visual observations of the nova were made by Mr. Campbell and others at Cambridge, and also were collected at Harvard in large numbers from many observers in all parts of the world. The spectrum was studied by Miss Cannon on more than one hundred spectrograms made with various telescopes at Cambridge and at the Harvard Station at Arequipa, Peru. The photographic light curve was investigated under the direction of Miss Leavitt, using mainly Harvard photographs.

The first two parts of this investigation of the nova have already been published in Volume 81 of the Harvard Annals, and the third part will soon appear as the final number of that volume.

A general summary of all the work is given below.

1. Photographs of the region obtained at the Harvard, Heidelberg and Yerkes Observatories show that the nova was a star between the tenth and eleventh magnitudes for at least thirty years before its discovery, with small, but well-confirmed, changes in light. Its spectrum at that time is placed by Miss Cannon somewhere near Class A, which would indicate that its absolute magnitude probably was not fainter than +3.5

before the outburst. If we accept this value, we find that the logarithm of the parallax,  $\log \pi = 0.2(3.5 - 10.5 - 5)$ , is not greater than  $-2.4$ , and the parallax is less than  $0.004$ , corresponding to a distance greater than  $800$  light years. And further, since the total variation was nearly twelve magnitudes, the absolute brightness of the nova at maximum was in excess of magnitude  $-8$ , making this one of the most highly luminous objects ever recorded.<sup>2</sup>

2. The rise in brightness began on June 7, 1918. The maximum was reached, at visual magnitude  $-1.2$ , two days later when the object for a time was brighter than any star in the sky except Sirius, being forty thousand times brighter than it was the week before. In the four years that have elapsed since the outburst, the nova has decreased in brightness to the tenth magnitude, and is now but slightly brighter than before June, 1918.

3. More than six thousand observations by two hundred and forty-eight observers were utilized in deriving the Harvard visual light curve. The observers were distributed as follows: North America 87, South America 3, Europe 132, Asia 8, Africa 5, Australasia 13.

4. From June 9 to June 25 the star decreased four magnitudes in brightness. Then it entered into remarkable series of semi-periodic fluctuations that lasted for nearly four months, while gradually the average brightness decreased two magnitudes. Since October, 1918, the nova has decreased five magnitudes more, with only minor irregularities.

5. Changes in the spectrum of the nova near maximum and during the oscillations on the descending branch were extremely complicated. They were characterized by the appearance of enhanced lines of iron and titanium during the rapid increase in light, later by the typical nova spectrum with its broad, bright and dark bands, and finally with the gradual predominance of the usual nebular lines.

6. The changes in the photographic light curve much resemble those of the visual light curve. For its determination more than a thousand photographic observations are available, nearly all of which were made on plates taken with half a dozen telescopes at Harvard.

7. A comparison of the photographic and visual light curves gives an indication of the color changes during the first few months of the star's activity. The color index remained slightly negative during the first five months, and then became positive as the star grew redder and fainter.

<sup>1</sup> *Trans. Internat. Astron. Union, London*, **1**, 1922 (89).

<sup>2</sup> Cf. Lundmark, *Pub. Astron. Soc. Pacific*, **34**, 1922 (209).